

CLAIMS

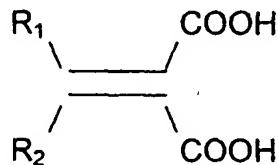
1. Use of compounds having general formula (I):

A · Cu
(I)

5 wherein:

- A represents the bibasic ion of an organic acid which can have the meanings (A₁) - (A₈);
- Cu represents the copper 2+ ion;
- (A₁) - (A₈) respectively represent the following carboxylic acids:

(A₁):



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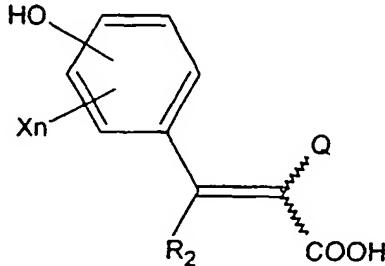
wherein:

- R₁ and R₂, the same or different, represent a hydrogen atom; a C₁-C₆ alkyl or C₁-C₆ haloalkyl group, linear or branched, optionally substituted; a C₂-C₆ alkenyl or 20 C₂-C₆ haloalkenyl group, linear or branched, optionally substituted; a C₃-C₆ cycloalkyl group, optionally substituted; a C₁-C₆ alkoxy or C₁-C₆ haloalkoxy group, linear or branched, optionally substituted; a C₁-C₆ alkylthio or C₁-C₆ haloalkylthio group, linear or branched, optionally 25 substituted; a C₃-C₆ cycloalkoxy group, optionally substituted;

stituted; an aryl group optionally substituted or a heteroaryl group optionally substituted; a heterocyclic group optionally substituted;

(A₂) :

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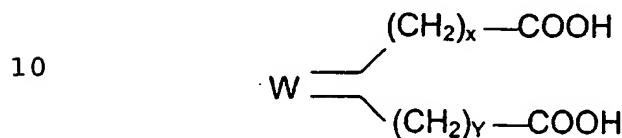
10 wherein:

- R₂ has the meanings defined above;
- Q represents a hydrogen atom; a C₁-C₆ alkyl or C₁-C₆ haloalkyl group, linear or branched, optionally substituted; a cyano group; a C₁-C₆ alkylcarbonyl or C₁-C₆ haloalkylcarbonyl group, linear or branched, optionally substituted; a C₁-C₆ alkoxy carbonyl, linear or branched, optionally substituted; an aminocarbonyl group; a C₁-C₆ alkylaminocarbonyl group; a C₂-C₁₂ dialkylaminocarbonyl group;
- X represents a hydrogen atom or a halogen atom; a hydroxyl group; a C₁-C₆ alkyl or C₁-C₆ haloalkyl group, linear or branched, optionally substituted; a C₁-C₆ alkoxy or C₁-C₆ haloalkoxy group, linear or branched, optionally substituted; a cyano group; a nitro group; an amine group; a C₁-C₆ alkylamine group; a C₂-C₁₂ dial-

kylamine group; a C₁-C₆ linear or branched thioalkyl group, possibly substituted; a C₁-C₆ linear or branched haloalkyl group, possibly substituted; a C₁-C₆ linear or branched alkylsulfinyl group, possibly substituted; a 5 C₁-C₆ linear or branched alkylsulfonyl group, possibly substituted;

- n is a number ranging from 1 to 4;

(A₃) :

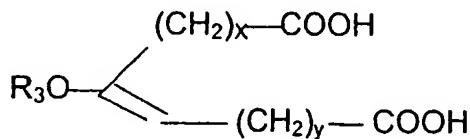


wherein:

- W represents an oxygen atom; a C₁-C₆ alkylimine group, linear or branched, optionally substituted; an 15 arylimine group optionally substituted; a hetero-aryl imine group optionally substituted; a C₁-C₆ alkoxyimine group, linear or branched, optionally substituted; an aryloxyimine group optionally substituted;

- x and y, the same or different, are a number ranging 20 from 0 to 4;

(A₄) :



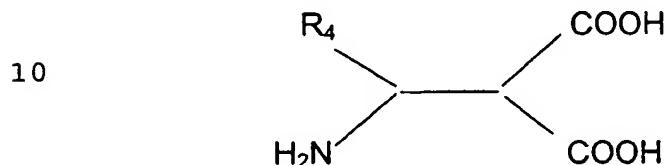
25 wherein:

- R₃ represents a C₁-C₆ alkyl or C₁-C₆ haloalkyl group, linear or branched, optionally substituted; a C₃-C₆ cycloalkyl group, optionally substituted; an aryl group, optionally substituted; a heteroaryl group, optionally substituted;

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- x and y, the same or different, are a number ranging from 0 to 4;

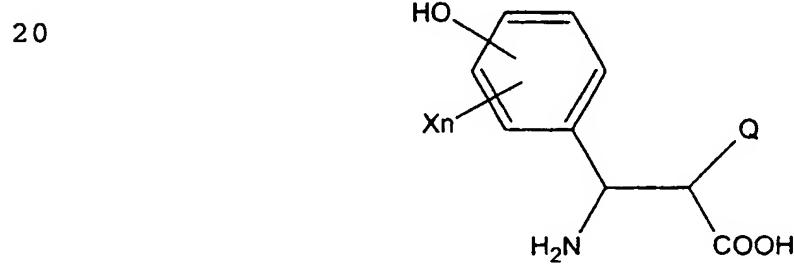
(A₅) :



wherein:

- R₄ represents a C₁-C₆ alkyl or C₁-C₆ haloalkyl group, linear or branched, optionally substituted; a C₃-C₆ cycloalkyl group, optionally substituted; an aryl group, optionally substituted; a heteroaryl group, optionally substituted;

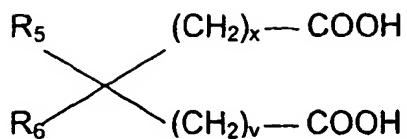
(A₆) :



25 wherein:

- Q, X and n have the same meanings defined above;

(A₇) :



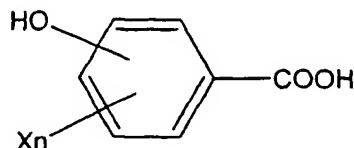
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wherein:

- R₅ and R₆, the same or different, represent a hydrogen atom; a halogen atom; a C₁-C₆ alkyl or C₁-C₆ haloalkyl group, linear or branched, optionally substituted; a C₂-C₆ alkenyl or C₂-C₆ haloalkenyl group, linear or branched, 10 optionally substituted; a C₂-C₆ alkynyl or C₂-C₆ haloalkynyl group, linear or branched, optionally substituted; a C₃-C₆ cycloalkyl group, optionally substituted; a C₁-C₆ alkoxy or C₁-C₆ haloalkoxy group, linear or 15 branched, optionally substituted; a C₁-C₆ alkylthio or C₁-C₆ haloalkylthio group, linear or branched, optionally substituted; a C₃-C₆ cycloalkoxy group, optionally substituted; a C₁-C₆ alkylamine group, linear or branched, 20 optionally substituted; a C₂-C₁₂ dialkylamine group, linear or branched, optionally substituted; a C₁-C₆ alkylcarbonylamine group, linear or branched, optionally substituted; an arylcarbonylamine group, optionally substituted; an aryl group, 25 optionally substituted; a heteroaryl group, optionally substituted; a heterocyclic group, optionally substituted;

- R₅ and R₆ can jointly form a C₁-C₆ cycle;
- x and y, the same or different, are a number ranging from 0 to 4 excluding cases wherein x and y are a number ranging from 0 to 2 and R₅ and R₆ are both a hydrogen atom;

5 (A₈) :



10 wherein

X and n have the same meanings described above excluding salicylic acid;

alone or in a mixture, for the control of bacterial and fungal phytopathogens on vegetables or parts thereof.

15 2. The use according to claim 1, characterized in that the compounds having general formula (I) are isomeric mixtures in any proportion or single isomers.

3. The use according to claim 1, characterized in that the compounds having general formula (I) are present in 20 hydrated form by the coordination of any number of water molecules.

4. The use according to claim 1, characterized in that the compounds having general formula (I) coordinate further metal cations inside their structure.

25 5. The use according to claim 1, characterized in that

the compounds having general formula (I) are in the form of mixed salts.

6. The use according to claim 1, characterized in that the compounds having general formula (I) are selected 5 from:

- copper (II) salt of 4-chlorobenzylidenemalonic acid;
- copper (II) salt of 4-hydroxy-3-methoxybenzylidene malonic acid;
- copper (II) salt of 3,4-dimethoxybenzylidene malonic 10 acid;
- copper (II) salt of 4-fluorobenzylidenemalonic acid;
- copper (II) salt of 4-trifluoromethylbenzylidene malonic acid;
- copper (II) salt of 4-dimethylaminobenzylidene malo- 15 nic acid;
- copper (II) salt of 2,4-dichlorobenzylidene malonic acid;
- copper (II) salt of 4-bromobenzylidene malonic acid;
- copper (II) salt of 4-hydroxy-3-methoxybenzylidene malonic acid monomethyl ester; 20
- copper (II) salt of 4-hydroxy-3-methoxybenzylidene malonic acid monoethyl ester;
- copper (II) salt of 2-cyano-3-(4-hydroxy-3-methoxyphenyl)propenoic acid;
- 25 • copper (II) salt of 2-acetyl-3-(4-hydroxy-3-

methoxyphenyl)propenoic acid;

- copper (II) salt of 2-aminocarbonyl-3-(4-hydroxy-3-methoxyphenyl)propenoic acid;
- copper (II) salt of 3-(4-hydroxy-3-methoxyphenyl)-2-methoxycarbonyl-2-butenoic acid;
- 5 • copper (II) salt of 4-hydroxy-3-methoxycinnamic acid;
- copper (II) salt of 2-hydroxycinnamic acid;
- copper (II) salt of 3-hydroxycinnamic acid;
- 10 • copper (II) salt of 4-hydroxycinnamic acid;
- copper (II) salt of 3-ketoglutaric acid;
- copper (II) salt of 3-methoxy-2-pentendioic acid;
- copper (II) salt of 3-amino-2-carboxy-3-(4-chlorophenyl)propanoic acid;
- 15 • copper (II) salt of 3-amino-2-carboxy-3-(2-hydroxyphenyl)propanoic acid;
- copper (II) salt of 3-amino-2-carboxy-3-(4-trifluoromethylphenyl)propanoic acid;
- copper (II) salt of 3-amino-2-carboxy-3-(4-hydroxy-20 3-methoxyphenyl)propanoic acid;
- copper (II) salt of 3-amino-2-carboxy-3-(3,4-dimethoxyphenyl)propanoic acid;
- copper (II) salt of 3-amino-3-(2-hydroxyphenyl)propanoic acid;
- 25 • copper (II) salt of 3-amino-3-(4-hydroxy-3-

methoxyphenyl)propanoic acid;

- copper (II) salt of 3-amino-2-cyano-3-(4-hydroxyphenyl)propanoic acid;
- copper (II) salt of 3-amino-2-cyano-3-(4-hydroxy-3-methoxyphenyl)propanoic acid;
- copper (II) salt of 2-methoxysuccinic acid;
- copper (II) salt of 2-ethoxysuccinic acid;
- copper (II) salt of 3-(2-furyl)-2-carboxypropenoic acid;
- 10 • copper (II) salt of 3-(2-thiazolyl)-2-carboxypropenoic acid;
- copper (II) salt of 3-benzylidene-2-carboxypropenoic acid;
- copper (II) salt of 1,1-cyclopropane dicarboxylic acid;
- 15 • copper (II) salt of diallylmalonic acid;
- copper (II) salt of ethylphenyl malonic acid;
- copper (II) salt of bis(2-cyanoethyl)malonic acid;
- copper (II) salt of N-morpholinemalonic acid;
- 20 • copper (II) salt of N-benzyloxyiminomalonic acid;
- copper (II) salt of 3-hydroxybenzoic acid;
- copper (II) salt of 4-hydroxybenzoic acid;
- copper (II) salt of 5-chloro-2-hydroxybenzoic acid;
- copper (II) salt of 5-bromo-2-hydroxybenzoic acid;
- 25 • copper (II) salt of 2-hydroxy-3-methoxybenzoic acid;

- copper (II) salt of 2-hydroxy-5-methoxybenzoic acid;
- copper (II) salt of 2-hydroxy-3-methylbenzoic acid;
- copper (II) salt of 4-hydroxy-3-methoxybenzoic acid;
- copper (II) salt of 3,5-dimethoxy-4-hydroxybenzoic
5 acid;
- copper (II) salt of 3,5-dichloro-4-hydroxybenzoic
acid;
- copper (II) salt of 3,5-dibromo-4-hydroxybenzoic
acid;
- 10 • copper (II) salt of 3,5-dimethyl-4-hydroxybenzoic
acid;
- copper (II) salt of 3-chloro-4-hydroxybenzoic acid;
- copper (II) salt of 2,3-dihydroxybenzoic acid;
- copper (II) salt of 2,6-dihydroxybenzoic acid;
- 15 • copper (II) salt of 3,4-dihydroxybenzoic acid.

7. Compounds having general formula (I'):

A' · Cu

(I')

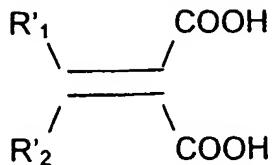
wherein:

20 - A' represents the bibasic ion of an organic acid which
can have the meanings (A'₁) - (A'₇);

- Cu represents the copper 2+ ion;

- (A'₁) - (A'₇) respectively represent the following car-
boxylic acids:

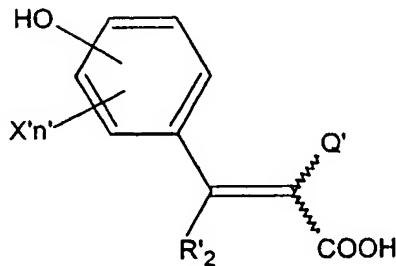
25 • (A'₁):



5 wherein:

- R'_1 represents an aryl group optionally substituted;
- R'_2 represents a hydrogen atom;
- (A'_2) :

10



wherein:

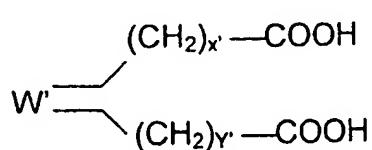
15 - X' represents a hydrogen or halogen atom; a hydroxyl group; a $\text{C}_1\text{-C}_6$ alkoxy group, linear or branched, optionally substituted;

- n' can have the value of 1 or 2;

- R'_2 represents a hydrogen atom;

20 - Q' represents a hydrogen atom; a $\text{C}_1\text{-C}_6$ alkoxy carbonyl group, linear or branched, optionally substituted; an acetyl group; a cyano group;

- (A'_3) :

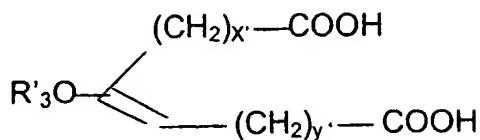


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wherein:

- W' represents an oxygen atom;
- x' and y' both have the value of 1;
- (A'_4) :

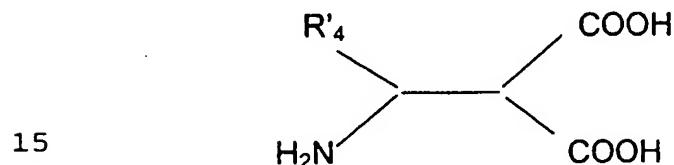
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wherein:

10 - R'_3 represents a C_1-C_3 alkyl group, linear or branched;

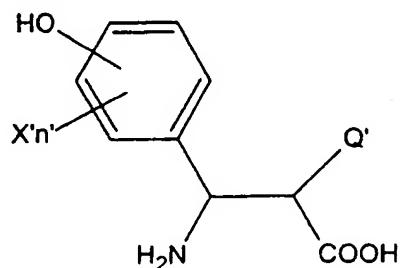
- x' is equal to 1 and y' is equal to 0;
- (A'_5) :



wherein:

- R'_4 represents an aryl group, optionally substituted;
- (A'_6) :

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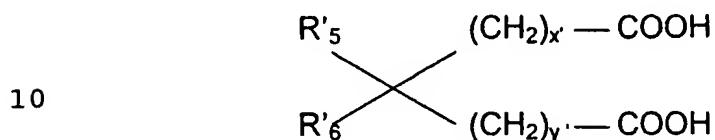
25 wherein:

- X' represents a hydrogen or halogen atom; a hydroxyl group; a C₁-C₆ alkoxyl group, linear or branched, optionally substituted;

- n' can have the value of 1 or 2;

5 - Q' represents a hydrogen atom; a C₁-C₆ alkoxy carbonyl group, linear or branched, optionally substituted; an acetyl group; a cyano group;

• (A' 7) :



wherein:

- R's represents a C₁-C₆ alkoxy group, linear or branched:

15 - R'₆ represents a hydrogen atom;

- x' is equal to 0 and y' is equal to 1.

8. The compounds according to claim 7, characterized in that they are selected from:

• copper (II) salt of 4-chlorobenzylidenemalonic acid;

20 • copper (II) salt of 4-hydroxy-3-methoxybenzylidene malonic acid;

- copper (II) salt of 3,4-dimethoxybenzylidene malonic acid:

• copper (II) salt of 4-fluorobenzylidene malonic

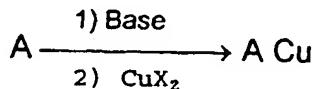
- copper (II) salt of 4-trifluoromethylbenzylidene malonic acid;
- copper (II) salt of 4-dimethylaminobenzylidene malonic acid;
- 5 • copper (II) salt of 2,4-dichlorobenzylidene malonic acid;
- copper (II) salt of 4-bromobenzylidene malonic acid;
- copper (II) salt of 4-hydroxy-3-methoxybenzylidene malonic acid monomethyl ester;
- 10 • copper (II) salt of 4-hydroxy-3-methoxybenzylidene malonic acid monoethyl ester;
- copper (II) salt of 2-cyano-3-(4-hydroxy-3-methoxyphenyl)propenoic acid;
- copper (II) salt of 2-acetyl-3-(4-hydroxy-3-methoxyphenyl)propenoic acid;
- 15 • copper (II) salt of 2-aminocarbonyl-3-(4-hydroxy-3-methoxyphenyl)propenoic acid;
- copper (II) salt of 3-(4-hydroxy-3-methoxyphenyl)-2-methoxycarbonyl-2-butenoic acid;
- 20 • copper (II) salt of 4-hydroxy-3-methoxycinnamic acid;
- copper (II) salt of 2-hydroxycinnamic acid;
- copper (II) salt of 3-hydroxycinnamic acid;
- copper (II) salt of 4-hydroxycinnamic acid;
- 25 • copper (II) salt of 3-ketoglutaric acid;

- copper (II) salt of 3-methoxy-2-pentendioic acid;
- copper (II) salt of 3-amino-2-carboxy-3-(4-chlorophenyl)propanoic acid;
- copper (II) salt of 3-amino-2-carboxy-3-(2-hydroxyphenyl)propanoic acid;
- copper (II) salt of 3-amino-2-carboxy-3-(4-trifluoromethyl phenyl)propanoic acid;
- copper (II) salt of 3-amino-2-carboxy-3-(4-hydroxy-3-methoxyphenyl)propanoic acid;
- 10 • copper (II) salt of 3-amino-2-carboxy-3-(3,4-dimethoxyphenyl)propanoic acid;
- copper (II) salt of 3-amino-3-(2-hydroxyphenyl)propanoic acid;
- copper (II) salt of 3-amino-3-(4-hydroxy-3-methoxyphenyl)propanoic acid;
- 15 • copper (II) salt of 3-amino-2-cyano-3-(4-hydroxyphenyl)propanoic acid;
- copper (II) salt of 3-amino-2-cyano-3-(4-hydroxy-3-methoxyphenyl)propanoic acid;
- 20 • copper (II) salt of 2-methoxysuccinic acid;
- copper (II) salt of 2-ethoxysuccinic acid;
- copper (II) salt of 3-(2-furyl)-2-carboxypropenoic acid;
- copper (II) salt of 3-(2-thiazolyl)-2-carboxypropenoic acid;
- 25

- copper (II) salt of 3-benzylidene-2-carboxypropenoic acid;
- copper (II) salt of diallylmalonic acid;
- copper (II) salt of ethylphenyl malonic acid;
- 5 • copper (II) salt of bis(2-cyanoethyl)malonic acid;
- copper (II) salt of N-morpholinemalonic acid;
- copper (II) salt of N-benzyloxyimino malonic acid.

9. The process for the preparation of compounds having general formula (I) according to any of the claims 10 1-8, characterized in that it comprises a reaction according to the reaction scheme A:

Scheme A



15 (II) (III) (I)

wherein A has the same meanings defined above and z has the value of 1 or 2.

10. Fungicidal compositions containing, as active principle, one or more compounds having general formula (I) 20 according to one of the claims 1-8.

11. The compositions according to claim 10, comprising other active principles compatible with the compounds having general formula (I), such as other fungicides, phyto-regulators, antibiotics, herbicides, insecticides, 25 fertilizers.

12. The compositions according to claim 10 or 11, characterized in that the concentration of the active principles varies from 0.1% to 98%, preferably from 0.5% to 90%.

5 13. Use of the fungicidal compositions according to any of the claims 10-12 for the control of phytopathogen fungi.

14. The use according to any of the claims 1-6 or 13, characterized in that the phytopathogens are: *Plasmopara*
10 *viticola* on vines; *Phytophthora* spp. on vegetables; *Pyricularia oryzae* on rice; *Venturia inaequalis* on apples; *Peronospora tabacina* on tobacco; *Pseudoperonospora cubensis* on cucurbitaceous products; *Bremia* on salads, spinach; *Alternaria* spp. on tomatoes, potatoes.

15 15. A method for the control of phytopathogen fungi in agricultural crops by the application of the compounds having general formula (I) according to one of the claims 1-8 or by the application of a fungicidal composition according to one of the claims 10-12.

20 16. The method according to claim 15, characterized in that the quantity of compound to be applied varies from 10 g to 5 kg per hectare.

17. The method according to claim 15, characterized in that the application takes place on all parts of the
25 plant, for example on the leaves, stems, branches and

roots, or on the seeds themselves before being planted, or on the ground in which the plant grows.

18. Use of the compounds having general formula (I) according to one of the claims 1-8 or of a fungicidal composition according to one of the claims 10-12 for the control of fungal phytopathogens on non-living substrates, such as plastics, metals, textile fibers, glass, wood, paper, foams, bricks.

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